PROVO RIVER
WATER USERS
ASSOCIATION

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

June 1, 2015

Kent Jones, P.E.
Utah State Engineer
Utah Division of Water Rights
P.O. Box 146300
Salt Lake City, Utah 84114-6300

Dear Mr. Jones:

Subject: Project River Project Return Flows from Foreign Diversions

The water rights of the Deer Creek Division of the Provo River Project (PRP) include a return flow right in Utah Lake based upon foreign water diversions. Water Right No. 55-262 (Appropriation A12144) is in the name of the Bureau of Reclamation and has a priority date of April 3, 1936. This right allows Provo River Water Users Association to reclaim PRP foreign water return flows that accumulate in Utah Lake by an exchange for natural flow Provo River water (system storage per the Utah Lake Distribution Plan) or Olmsted power water (per the Deer Creek Reservoir/Jordanelle Reservoir Operating Agreement) stored in Deer Creek Reservoir. The historic method of determining these return flows is cumbersome and is dependent on all prior year calculations since the inception of the method. A new proposed method for calculating PRP return flows is described in the enclosed memorandum. Reclamation and the Association respectfully request that this new method be adopted.

We appreciate the time you and your staff have spent in meeting with us and reviewing the proposed new method for determining PRP return flows. We view this as a simple modification to the method of calculation used to support the original Proof filing and propose that this be characterized as such. In our previous meetings, you described the processes by which we may incorporate this new method. We request that you proceed with the administrative approach described in order for you to adopt the new method of calculation.

Enclosed is the final memorandum describing the proposed method of determining future return flows. We appreciate you working with us. This water right is an important part of the PRP water right portfolio. Please contact Jeffrey Budge at the Association at 801.796.8770 or Justin Record at Reclamation at 801.379.1072 if you need further information or would like to meet again.

Sincerely,

G. Keith Denos, P.E.
Provo River Water Users Association
General Manager

Wayne G. Pullan
Bureau of Reclamation
Area Manager

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JH

Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM

TO: Keith Denos
Provo River Water Users Association
285 West 1100 North
Pleasant Grove, Utah 84062

COPIES: Jeff Budge, Provo River Water Users Association

FROM: Michael Collins
Bowen Collins and Associates
154 East 14000 South
Draper, Utah 84020

DATE: April 29, 2014 (with March 2015 updates)

SUBJECT: Return Flow Credit – Water Right 55-262 (A12144) -

JOB NO.: 006-13-01

INTRODUCTION

The Provo River Water Users Association (Association) has a return flow water right as part of the Deer Creek Division of the Provo River Project (PRP). The water right allows for the exchange of PRP import water return flows in Utah Lake for storage of Provo River water in Deer Creek Reservoir. The present method of determining these return flows is difficult and is dependent on prior year calculations since the inception of the spreadsheet. This allows for compounding of errors and requires third party information to be complete. As a result, the Association and the State Engineer have had a difficult time quantifying the water available under this right. The purpose of this memorandum is to clarify the issue by presenting historical context and a simplified return flow method.

RETURN FLOW WATER RIGHTS SUMMARY

Water right # 55-262 (application A12144) is in the name of the USBR and has a priority date of April 3, 1936. The right allows the Association to reclaim PRP foreign water return flows and other PRP flows that accumulate in Utah Lake by an exchange the following year for natural flow Provo River water stored in Deer Creek Reservoir. PRP water accumulated in Utah Lake typically consists of PRP import water return flows captured in Utah Lake.

PRP water in Utah Lake is exchanged to Deer Creek Reservoir under Application to Appropriate Nos. A12144 and A12141 (limited to 30,000 Ac-Ft exchange annually) and under the 1938 Power Contract and the Jordanelle and Deer Creek Operating Agreements.

WATER RIGHT YIELD

A water right proof was submitted by the USBR in 1963, but this water right has never been certificated due to the State Engineer's uncertainty as to the best method of calculating return flow volumes to Utah Lake. In some past years, the volume of return flow eligible for recovery by exchange has been calculated via a "return flow spreadsheet". This spreadsheet appears to have been originally developed by the State Engineer as a method of estimating return flow for Association water rights. The return flow spreadsheet has not been maintained since 2003. This is primarily due to water accounting changes and the lack of availability of some data from third parties needed to make these calculations.

The historic approach to calculating return flow used by the State Engineer has a number of problems:

1. The return flow spreadsheet is complicated and the input data is not always available from third parties. If a single input data point is not available in any one year it makes calculation of percent import water in each subsequent year incorrect and consequently the total return flow value calculated is affected in each subsequent year. As such, the spreadsheet has not been maintained for the past 10 years. In addition, Association shareholders have had changes in their water usage and corresponding changes to the total volume of PRP water used in Utah County.
2. The actual quantity of water used in Utah County changes from year to year based on shareholders' annual water uses. The return flow should be based on actual deliveries in Utah County rather than an assumed constant Utah County ratio as has been the case with the return flow spreadsheet. Utah County use also changes as shares in irrigation companies served by the Association are transferred between different owners. The newly constructed Provo River Aqueduct (PRA) which enclosed the Provo Reservoir Canal thus eliminating seepage from the canal has also changed the amount of return flow to Utah Lake. Also, previous methods for calculating return flow did not factor in all the PRP water delivered to Utah County thru the Point of the Mountain (POM) facilities. To reflect these changes an updated approach is required.

PROVO RIVER PROJECT WATER USE IN UTAH COUNTY

The use of PRP water in Utah County occurs through a variety of shareholder service areas, exchange agreements and shareholder owned facilities. For purposes of discussion, the Utah County PRP water use has been categorized into two groups:

1. Shareholders with service areas that are exclusively within Utah County

2. Shareholders with service areas or water exchange agreements that include deliveries in both Salt Lake County and Utah County

Shareholders with Exclusive Use in Utah County. The Association shareholders with service areas exclusively in Utah County are presented in Table 1 below.

Table 1
Association Shareholders Exclusively in Utah County

Utah County Shareholders	PRP Shares
Metropolitan Water District of Provo City	8,000
Highland Conservation District	5,010
Metropolitan Water District of Orem	2,254
Provo Bench Canal and Irrigation	2,000
Pleasant Grove Irrigation company	1,011
American Fork Metropolitan Water District	500
Lehi City	500
Pleasant Grove Metropolitan Water District	300
Lindon City	200
Dixon Irrigation Company	300
Total	**20,075**

It is noted that actual annual water use from these shareholders will vary each year and may total more than 20,075 acre-feet in years when sufficient PRP holdover storage or extra allotment is used by individual shareholders.

Shareholders with Some Deliveries to Utah County. Both the Metropolitan Water District of Salt Lake & Sandy (MWDSLS) and Provo Reservoir Water Users Company (PRWUC) deliver PRP water to both Utah County and Salt Lake County by virtue of their service areas and/or by exchange agreements with canal companies serving Utah County.

MWDSLS holds 61,700 shares of the Association and provides PRP water to Utah County in connection with its deliveries to the South Branch of the Utah Lake Distributing Company (ULDC). PRP water is delivered to ULDC by diverting water from the end of the PRA into the Point of the Mountain (POM) Penstock. This water powers a turbine adjacent to the Jordan River and then is diverted into the ULDC South Branch canal. The turbine is used to pump water from the Jordan River into the North Branch canal of the ULDC. Only the water that flows thru the penstock (and into the South Branch canal) is considered PRP deliveries to Utah County. Based on available Association and MWDSLS records, annual PRP penstock deliveries to Utah County varied substantially during the period 2001-2013. MWDSLS deliveries to Utah County can drastically affect the total amount of PRP water use in Utah County in any given year.

PRWUC holds 16,000 shares of the Association and provides PRP water to multiple entities via shares owned in PRWUC. PRWUC is organized into 4 districts: Welby, Jacob, Alpine and Orem. Jordan Valley Water Conservancy District (JVWCD) owns 100 percent of the Welby and Jacob districts and some portions of the Alpine and Orem districts. Orem City and several other Utah County water users and cities comprise the other portions of the Alpine and Orem Districts. Annual water reports of the Association provide sufficient data to account for the amount of PRP water used by Utah County users associated with the PRWUC's Alpine and Orem Districts, but JVWCD deliveries need to be accounted for separately. JVWCD's Welby Jacob exchange allows for PRP water to be delivered into Utah County via the POM siphon into the Jacob Canal. JVWCD deliveries to the Jacob Canal may come from either PRP sources, Provo River natural flows water rights, or from Jordan River sources. Only those JVWCD Jacob Canal deliveries that originate from PRP waters (through the POM siphon) are included as PRP water used in Utah County.

The MWDSLS's deliveries and JVWCD's portion of PRWUC deliveries to Utah County have not been accounted for in previous methods of calculating return flows to Utah Lake. It is critical that any future calculation of Utah Lake return flows include these water deliveries and that calculations are based on the actual Utah County PRP deliveries in any given year.

RETURN FLOW CALCULATION

The Association desires to have a return flow calculation that is easily developed and based on numbers that can be obtained early enough to allow for a determination of the return flows at the end of the water year. The proposed calculation of return flows is based on the following criteria:

- Return flows should be based on the amount of water delivered to Utah County each year by the Association.
- The percent of return flows available to claim should be based on the Utah County water uses and the typical return flow percentage applicable for each use.

Based on these criteria, the overall return flow would be calculated by determining the amount of water delivered to Utah County, multiplied by the composite return flow percentages for each Utah County user.

Table 2 shows the Utah County uses for the water years 2009-2013 for each individual shareholder. Total Utah County uses in this period varied from just over 14,000 acre-feet to over 32,000 acre-feet. This table assigns return flow percentages to each use for each year to develop an overall average return flow credit percentage for the period of 54.4 percent. These numbers are an estimate of return flow percentages by use and will need to be reviewed by the Division of Water Rights. When approved, actual yearly deliveries based on the Provo River Commissioner's report will be combined with actual water uses to arrive at a composite return flow percentage for the year.

Table 3 shows the total Association diversions from each of its basins for the years 1995-2013. It also shows usage in Utah County from 2001-2013. The total return flow credit is calculated by multiplying the previous year's Utah County use by the overall return flow percentage of 54.4 percent calculated in Table 2. The overall return flows for the period from 2002-2013 vary from 7,647 acre-feet to 26,678 acre-feet.

These return flows will also have to be adjusted for evaporation losses in Utah Lake. Evaporation losses will depend on how many years the water is left in the lake. As long as the lake does not spill, the return flows remain in the lake subject to a reduction for evaporation.

Table 4 shows the calculation by water delivery for the Association for 2014 based on actual deliveries to Utah County and return flow percentages based on the usage by each shareholder for 2014.

CONCLUSIONS

The existing Utah Lake Return flow spreadsheet is complicated and requires input data points that are not always available. A missing data point in any one year perpetuates errors to the following year's calculation of return flows. A return flow calculation that relies on this spreadsheet invites errors and perpetuates a climate of uncertainty regarding the volume of water eligible for exchange under this water right. When the Association is uncertain as to the volume eligible for exchange, the full right is often not claimed for exchange.

A new method of calculating return flow volume eligible for exchange is proposed. This method would rely on the amount of Utah County deliveries and an overall return flow percentage for those Utah County deliveries.

Table 2
Calculation of Return Flow Credit-Flows Into Utah County
Provo River Water Users Association

PRWUA shareholders with Utah County Use	Use Category	Return Flow %	2013 water Use (AcFt)	Return Flow 2013	2012 water Use (AcFt)	Return Flow 2012	2011 water Use (AcFt)	Return Flow 2011	2010 water Use (AcFt)	Return Flow 2010	2009 water Use (AcFt)	Return Flow 2009
Orem MWD	M&I	80%	2,740	2,192	1,617	1,294	1,370	1,096	3,372	2,698	1,203	962
Dixon Irrig. Co. (Orem MWD)	M&I	80%	0	0	531	425	14	11	378	302	238	190
Provo MWD	M&I	80%	3,896	3,117	3,025	2,420	1,612	1,290	3,178	2,542	3,528	2,822
American Fork MWD	Irrigation	35%	162	57	732	256	237	83	493	173	290	102
HCD -Highland Conservation District	Irrigation	35%	377	132	1,094	383	1,934	677	1,458	510	1,315	460
HCD -Highland City	M&I	80%	1,388	1,110	2,674	2,139	96	77	1,751	1,401	999	799
HCD -Lehi City	Irrigation	35%	306	107	866	303	663	232	842	295	479	168
HCD -American Fork City	Irrigation	35%	288	101	574	201	17	6	370	130	256	90
Lehi City	M&I	80%	336	269	527	422	377	302	500	400	276	221
Lindon City	M&I	80%	106	85	267	214	19	15	194	155	407	326
Pleasant Grove Irrigation	Irrigation	35%	244	85	1,110	389	637	223	792	277	1,009	353
Pleasant Grove MWD	M&I	80%	0	0	359	287	48	38	497	398	540	432
Provo Bench Irrigation	Irrigation	35%	520	182	1,195	418	0	0	1,180	413	1,044	365
PRWUC - Orem MWD	Irrigation	35%	0	0	4,789	1,676	507	177	3,087	1,080	3,158	1,105
PRWUC - Alpine District	Irrigation	35%	412	144	2,286	800	2,129	745	1,534	537	1,066	373
PRWUC - Pleasant Grove MWD	Irrigation	35%	0	0	361	126	11	4	175	61	213	75
PRWUC - Highland City	Irrigation	35%	0	0	239	84	45	16	420	147	233	82
PRWUC - Lehi City	Irrigation	35%	139	49	141	49	203	71	184	64	938	328
PRWUC - Lehi Irrigation	Irrigation	35%	183	64	483	169	223	78	695	243	0	0
PRWUC - American Fork City	Irrigation	35%	19	7	95	33	5	2	35	12	47	16
PRWUC- JVWCD, Project Water Deliveries	Flood Irrigation	50%	0	0	1,434	717	4,057	2,029	2,121	1,061	2,515	1,258
ULDCF South Branch	Flood Irrigation	50%	4,660	2,330	7,744	3,872	0	0	8,534	4,267	12,024	6,012
		Total	**15,776**	**10,030**	**32,143**	**16,677**	**14,204**	**7,171**	**31,790**	**17,166**	**31,778**	**16,539**
		% Return Flow		**63.58%**		**51.88%**		**50.49%**		**54.00%**		**52.05%**

2013-2009	**Average Return flow % =**	**54.40%**

Table 3
Return Flow Credit Calculations
Provo River Water Users Association
Import Water Percentage in Utah County

Year	Duchesne	Weber	Provo	Total	Utah County Use	Utah County Use-Previous Year	Return Flow Percentage (54.4%)
1995	28,778	43,751	54,144	126,673			
1996	30,290	45,126	51,108	126,524			
1997	38,102	8,455	87,668	134,225			
1998	31,599	28,013	103,171	162,783			
1999	30,915	36,837	27,751	95,503			
2000	27,717	27,940	24,199	79,856			
2001	27,316	26,400	18,287	72,003	23,896		
2002	20,990	23,784	13,558	58,332	15,269	23,896	12,999
2003	28,447	28,083	23,136	79,666	20,819	15,269	8,306
2004	27,355	17,677	23,417	68,449	14,057	20,819	11,326
2005	27,980	60,180	79,710	167,870	17,103	14,057	7,647
2006	22,098	30,042	92,133	144,273	37,013	17,103	9,304
2007	26,282	27,960	5,701	59,943	49,041	37,013	20,135
2008	25,282	41,771	16,236	83,289	28,048	49,041	26,678
2009	27,446	54,078	61,129	142,653	31,778	28,048	15,258
2010	28,161	42,115	8,068	78,344	31,790	31,778	17,287
2011	10,678	34,339	105,144	150,161	14,205	31,790	17,294
2012	18,519	8,770	1,380	28,669	32,143	14,205	7,728
2013	23,979	9,836	1,500	35,315	15,775	14,205	7,728
Average	**26,418**	**31,324**	**41,971**	**99,712**	**25,587**	**24,769**	**13,474**

Notes:

1. Utah County use based on Utah County use previous year times the return flow credit of 54.4%
2. Return flow credit calculation are shown on Table 2
3. Total return flows do not include the evaporation losses from storage in Utah Lake

Table 4

Return Flow Estimates-Imported Water From Duchesne and Weber Basins
Provo River Water Users
Water Year 2014

Shareholder	Nov A	Nov B	Dec A	Dec B	Jan A	Jan B	Feb A	Feb B	Mar A	Mar B	Apr A	Apr B	May A	May B	June A	June B	July A	July B	Aug A	Aug B	Sep A	Sep B	Oct A	Oct B	Totals	Potable	Potable (90%)	General M&I Deliveries	General M&I Deliveries (60.8%)	Irrigation	Irrigation (35%)	Total Return Flows
Provo City	195	206	194	211	200	214	174	150	173	207	271	62.34	12.38	143.5	36.85	110.14	34.28	23.64	9.13	14.45	10	12.7	10.5	229	2903.91	2,257	2,032	647	393		-	2,425
North Fork SSD-Hamblin Exchange	8	9	8	8	8	8	9	8	8	9	7.3	9	8.4	8.5	3.9	5.2	11.28	11.6	4.1	4.5	4.1	8.7	5.5	8	183.08							
Redford-Hanblin Exchange	1	2	2	4	1	2	3	2	2	3	2	2	4	4	8	10	12	12	5	5	6	4	5	3	104							
Orem City																											-				-	-
Provo Res. Co.	6	0	0	0	303	280	223	285	339	231	249	0	0	0	0	0	225	225	524.8	244.99	429.8	306.45	284.8	212	4368.84	1,910	1,719	2,453	1,491		-	3,210
Provo Bench	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-				-	-
MWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-				-	-
Dixon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-				-	-
JVWCD Jacob Canal														246.86	78.8										325.66		-				-	-
Highland City - Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	338.91	113.8	7.1	146	195.6	0	0	0	801.41		-			801	280	280
Highland City HCD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	320	107.85	9.77	0	245.22	110.17	0	878.01		-			878	307	307
Pleasant Grove City																											-			-	-	-
Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0	0	0	0	6	81		-			81	28	28
MWD & Irr.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-			-	-	-
Irrigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	30	0	0	48		-			48	17	17
Provo Bench	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	0	0	0	31		-			31	11	11
Lindon City																											-			-	-	-
Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3		-			3	1	1
Lindon City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-			-	-	-
Provo Bench	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	50	105	0	0	0	0	0	171		-			171	60	60
Provo Res. Co. - Alpine District	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	35	102.15	164	8.8	5.2	0	0	19.42	1.9	367.47		-			367	129	129
Lehi City																											-			-	-	-
Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20.73	80.2	45.4	19	30	43.02	33.7	8.8	280.85		-			281	98	98
Lehi City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28.7	80.4	75.9	80	50	0	0	0	315		-			315	110	110
HCD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33.7	116.5	102.4	91.9	101.3	48.8	62	0	0	556.6		-			557	195	195
Lehi Irrigation																											-			-	-	-
Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		-			-	-	-
American Fork City																											-			-	-	-
Provo Res. Co.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42.7	0	0	0	0	0	0	0	42.7		-			43	15	15
MWD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98.9	143.8	76.8	0	0	0	0	0	319.5		-			320	112	112
HCD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14.9	94	73.7	62.6	0	0	245.2		-			245	86	86
Highland Con. Dist Other	0	0	0	0	0	0	0	0	0	0	0	0	25.7	80.7	7.9	80.7	130.9	105.4	100.7	111.8	163.9	63.6	3.2	0	874.5		-			875	306	306
MWD of SL & S Penstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	954.5	1375.5	1247.3	1218	1451.5	0	6246.8		-			6,247	2,186	2,186
																									19,148	**4,167**	**3,751**	**3,099**	**1,884**	**11,262**	**3,942**	**9,577**

Notes:
1. M&I flows estimate as indoor usage from Nov thru April
2. Summer usage from May thru October based on recent State of Utah study showing combined return flows of 60.8%

Return Flow Percentage 2014 **50%**